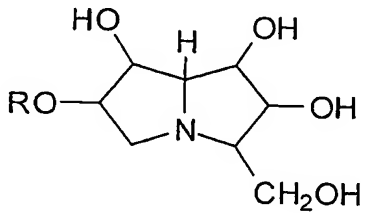
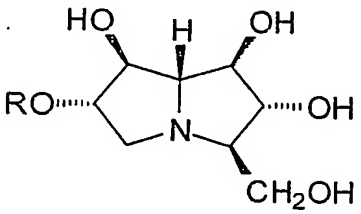
CLAIMS:

1. An isolated immunomodulatory (e.g. immunostimulatory) polyhydroxylated pyrrolizidine compound for use in therapy or prophylaxis having the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt or derivative thereof.

2. The compound of claim 1 having the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt or derivative thereof.

3. The compound of claim 1 or claim 2 which induces, potentiates or activates one or more cytokines (e.g. Th1 cytokines) *in vivo* and/or suppresses one or more cytokines (e.g. Th2 cytokine(s)) *in vivo*.

4. The compound of claim 3 wherein the one or more cytokines comprises one or more interleukins.

5. The compound of claim 4 wherein the one or more interleukins induced, potentiated or activated comprises IL-12 and/or Il-2 (e.g. in dendritic cells).

6. The compound of any one of the preceding claims which is a glycosidase inhibitor.

7. The compound of claim 6 which inhibits glucosidase.

8. The compound of any one of the preceding claims which does not inhibit mannosidase.

9. The compound of any one of the preceding claims which:
   (a) modifies tumour cell glycosylation (e.g. tumour antigen glycosylation); and/or
   (b) modifies viral protein glycosylation (e.g. virion antigen glycosylation); and/or
   (c) modifies cell-surface protein glycosylation in infected host cells; and/or
   (d) modifies bacterial cell walls,

when administered *in vivo*.

10. The compound of any one of the preceding claims which is an acyl derivative.

11. The compound of claim 10 which is:
   (a) peracylated; or
   (b) acylated at C-3 hydroxymethyl; or
   (c) acylated at C-6;
   (d) acylated at C-3 hydroxymethyl and C-6.

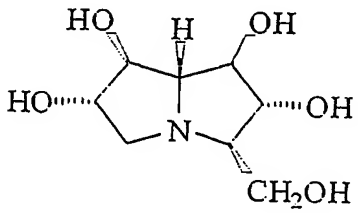
12. The compound of claim 10 or claim 11 wherein the acyl derivative is alkanoyl or aroyl.

13. The compound of claim 12 wherein the acyl derivative is an alkanoyl selected from acetyl, propanoyl or butanoyl.

14. The compound of any one of claims 1 to 13 wherein R is a saccharide moiety.

15. The compound of claim 14 wherein R is a glucoside or arabinoside moiety.

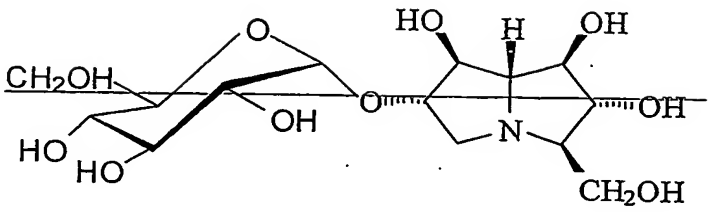
16. The compound of claim 2 which is 1R,2R,3R,6S,7S,7aR)-3-(hydroxymethyl)-1,2,6,7-tetrahydroxypyrrolizidine (casuarine), wherein R is hydrogen and having the formula:



or a pharmaceutically acceptable salt or derivative thereof.

17. The compound of claim 2 which is a casuarine glycoside, or a pharmaceutically acceptable salt or derivative thereof.

18. The compound of claim 17 which is casuarine-6-α-D-glucoside of the formula:



or a pharmaceutically acceptable salt or derivative thereof.

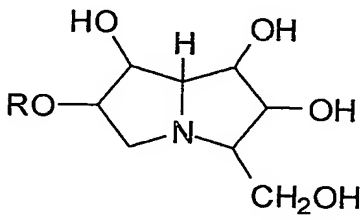
19. The compound of claim 2 which is 6-O-butanoylcasuarine, or a pharmaceutically acceptable salt or derivative thereof.

20. The compound of claim 1 which is selected from:

(a) 3,7-*diepi*-casuarine;
(b) 7-*epi*-casuarine;
(c) 3,6,7-*triepi*-casuarine;
(d) 6,7-*diepi*-casuarine;
(e) 3-*epi*-casuarine;
(f) 3,7-*diepi*-casuarine-6-α-D-glucoside;
(g) 7-*epi*-casuarine-6-α-D-glucoside;
(h) 3,6,7-*triepi*-casuarine-6-α-D-glucoside;
(i) 6,7-*diepi*-casuarine-6-α-D-glucoside; and
(j) 3-*epi*-casuarine-6-α-D-glucoside,

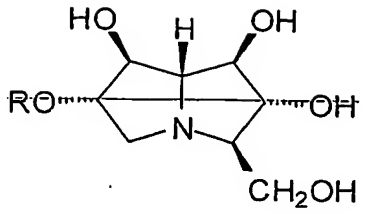
or a pharmaceutically acceptable salt or derivative thereof.

21. A method for immunomodulation (e.g. immunostimulation) comprising administering to a patient a composition comprising a polyhydroxylated pyrrolizidine compound having the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt or derivative thereof.

22. The method of claim 21 wherein the compound has the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt or derivative thereof.

23. The method of claim 21 or claim 22 wherein the compound is as defined in any one of claims 1 to 20.

24. The method of any one of claims 21 to 23 wherein the composition comprises an isolated compound or a combination of one or more of the compounds as defined in any one of claims (for example wherein the composition comprises a combination of casuarine and casuarine-6-α-D-glucoside).

25. The method of any one of claims 21 to 24 wherein the composition is a herbal medicine.

26. The method of claim 25 wherein the botanic source of the herbal medicine comprises one or more plant species selected from:

(a) a member of the taxon *Myrtaceae* (for example *Myrtus spp. (e.g. M. communis)*, *Syzygium* spp. (e.g. *S. guineense*) or *Eugenia* spp. (e.g. *E. jambolana*); or

(b) a member of the taxon *Casuarinaceae*;

(c) a combination of two or more plant species selected from both of the taxons of (a) and (b).

27. The method of any one of claims 21 to 26 which comprises haemorestoration.

28. The method of claim 27 wherein the haemorestoration is adjunctive to:

(a) chemotherapy; and/or

(b) radiotherapy; and/or

(c) bone marrow transplantation; and/or

(d) haemoablative immunotherapy.

29. The method of any one of claims 21 to 28 which comprises the alleviation of immunosuppression.

30. The method of claim 29 wherein the immunosuppression is congenital, acquired (e.g. by infection or malignancy) or induced (e.g. deliberately as part of the management of transplants or cancers).

31. The method of any one of claims 21 to 30 which comprises induction, potentiation or activation of one or more cytokines (for example IL-12 and/or IL-2) *in vivo*.

32. The method of any one of claims 21 to 30 which comprises the treatment of proliferative disorders, for example proliferative disorders selected from cancer and cancer metastasis.

33. A method for chemoprotection comprising administering the compound as defined in any one of claims 1 to 20 or composition as defined in any one of claims 21 to 32 to a patient undergoing chemotherapy.

34. Use of the polyhydroxylated pyrrolizidine compound as defined in any one of claims 1 to 20 or composition as defined in any one of claims 21 to 32 for the manufacture of a medicament for use in immunomodulation (e.g. immunostimulation) and/or chemoprotection.

35. A process for the manufacture of a medicament for use in immunomodulation (e.g. immunostimulation) and/or chemoprotection, characterized in the use of the polyhydroxylated pyrrolizidine compound as defined in any one of claims 1 to 20 or composition as defined in any one of claims 21 to 32.

36. The use of claim 34 or process of claim 35 wherein the immunomodulation and/or chemoprotection is as defined in any one of claims 21 to 33.

37. A composition comprising a polyhydroxylated pyrrolizidine compound as defined in any one of the preceding claims in combination with:

(a) an immunostimulant; and/or
(b) a cytotoxic agent (e.g. cyclophosphamide, cortisone acetate, vinblastine, vincristine, adriamycin, 6-mercaptopurine, 5-fluorouracil, mitomycin C or chloramphenicol); and/or
(c) an antimicrobial (e.g. antibacterial) agent; and/or
(d) an antiviral agent (e.g. AZT)
(e) a dendritic cell (e.g. a primed dendritic cell).

38. The composition of claim 37 further comprising a pharmaceutically acceptable excipient.

39. A vaccine comprising a polyhydroxylated pyrrolizidine compound as defined in any one of claims 1 to 20 or composition as defined in any one of claims 21 to 32 in combination with an antigen, the compound being present in an amount sufficient to produce an adjuvant effect on vaccination.

40. A pharmaceutical kit of parts comprising a polyhydroxylated pyrrolizidine compound as defined in any one of claims 1 to 20 or composition as defined in any one of claims 21 to 32 in combination with any or all of the adjunctive therapeutic agents defined in claim 37(a)-(d).

41. The kit of claim 40 further comprising instructions for use.

42. The compound of any one of claims 1 to 20 for use in therapy or prophylaxis, wherein the therapy or prophylaxis comprises:

(a) Increasing the Th1:Th2 response ratio;
(b) Haemorestoration;

(c) Alleviation of immunosuppression;
(d) Cytokine stimulation;
(e) Treatment of proliferative disorders (e.g. cancer);
(f) Vaccination, wherein the compound acts as an adjuvant;
(g) Vaccination with a dendritic cell vaccine (e.g. a primed dendritic cell vaccine), wherein the dendritic cells are contacted with the compound;
(h) Administration of dendritic cells in the treatment or prophylaxis of autoimmune disorders, wherein the dendritic cells are contacted with the compound; and/or
(i) Wound healing;
(j) Stimulating the innate immune response;
(k) Boosting the activity of endogenous NK cells.

43. The compound of any one of claims 1 to 20 wherein the therapy or prophylaxis comprises:

(a) the treatment of Th1-related diseases or disorders;
(b) the treatment of Th2-related diseases or disorders (for example allergies, e.g. asthma);
(c) the treatment of bacterial infections;
(d) the treatment of viral infections;
(e) the treatment of prion (e.g. BSE and CJD), fungal, protozoan or metazoan infections;
(f) the treatment of diseases associated with intracellular pathogens (e.g. leishmaniasis, trypanosomiasis or malaria).

44. The compound of claim 43 (d) wherein the viral infection is selected from respiratory syncytial virus (RSV), hepatitis B virus (HBV), Epstein-Barr, hepatitis C virus (HCV), herpes simplex type 1 and 2, herpes genitalis, herpes keratitis, herpes encephalitis, herpes zoster, human immunodeficiency virus (HIV), influenza A virus, hantann virus (hemorrhagic fever), human papilloma virus (HPV) and measles.